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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/791,927	03/02/2004	Matthew J. Carey	HSJ920030268US1	3829

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THOMAS R. BERTHOLD
18938 CONGRESS JUNCTION COURT
SARATOGA, CA 95070

EXAMINER	
KAYRISH, MATTHEW	
ART UNIT	**PAPER NUMBER**
2627	
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04/30/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/791,927	CAREY ET AL.	
	Examiner	Art Unit	
	Matthew G. Kayrish	2627	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04 April 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,2,4-15 and 17-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,4-15 and 17-23* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *02 March 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Allowable Subject Matter

The indicated allowability of claims 3 and 16 is withdrawn in view of the newly discovered reference to Nagahama et al. Rejections based on the newly cited reference follow.

Response to Arguments

Applicant's arguments with respect to claims 1-21 have been considered but are moot in view of the new ground(s) of rejection. Claims 1 and 9 have been amended to contain the subject matter of canceled claims 3 and 16. Claims 22 and 23 have been added. The previous rejection has been withdrawn, and a new response period has been set. Claims 1, 2, 4-15 and 17-23 remain pending.

Claim Rejections - 35 USC § 103

Claims 1, 2, 5-9, 15 and 18-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fukuzawa et al (US Publication Number 2002/0048690), in view of Nagahama et al (US Publication Number 2004/0144995).

Regarding claim 1, Fukuzawa discloses:

An antiferromagnetically exchange-coupled structure in a magnetic device of the type having a substrate and a plurality of ferromagnetic layers, the structure being formed on the substrate and comprising:

An underlayer (figure 17, item 142) formed of a substantially chemically-ordered alloy having a tetragonal crystalline structure, the alloy selected from the group consisting of alloys of AuCu, FePt, FePd, AgTi3, Pt Zn, PdZn, IrV, CoPt and PdCd (paragraph 313);

An antiferromagnetic layer in contact with the underlayer (figure 17, item 143) and formed of a substantially-chemically-ordered alloy comprising X and Mn and having a tetragonal crystalline structure, wherein X is selected from the group consisting of Pt, Ni, Ir, Pd and Rh (paragraph 313); and

A pinned ferromagnetic (figure 17, item 1443) layer exchange-coupled with the antiferromagnetic layer (paragraphs 315 & 316).

Fukuzawa fails to specifically disclose:

An underlayer formed of a substantially chemically-ordered alloy having a tetragonal crystalline structure, the alloy selected from the group consisting of alloys of AuCu, FePt, FePd, AgTi3, Pt Zn, PdZn, IrV, CoPt and PdCd, said underlayer allow further comprising at least one element selected from the group consisting of Pd, Fe, Pt, and Rh.

Nagahama discloses:

An underlayer (figure 5, item 12) formed of a substantially chemically-ordered alloy having a tetragonal crystalline structure (paragraph 1, Body-centered cubic is tetragonal), the alloy selected from the group consisting of alloys of AuCu, FePt, FePd, AgTi3, Pt Zn, PdZn, IrV, CoPt and PdCd, said underlayer allow further comprising at

least one element selected from the group consisting of Pd, Fe, Pt, and Rh (paragraph 69).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the MR head of Fukuzawa with an underlayer, that can be made of a wide range of materials, as stated by Nagahama, because the underlayer will further facilitate exchange coupling between the AFM layer and the pinned layer, as stated in paragraph 71, and the wide range of materials can be interchanged to provide for slightly varying properties with the same general output as implied in paragraph 69..

Regarding claims 2 and 15, Fukuzawa and Nagahama disclose the features of base claim 1 as stated in the 103 rejection above, Fukuzawa further discloses:

A seed layer consisting essentially of Ru or Rh, the underlayer being located on the seed layer (paragraph 260).

Regarding claims 5 and 18, Fukuzawa and Nagahama disclose the features of base claim 1 as stated in the 103 rejection above, Fukuzawa further discloses:

Wherein the first element listed in each underlayer alloy in the group is present in the alloy in amount between approximately 35 and 65 atomic percent (paragraph 313, (non-subscripted alloys are understood to be 50/50 or (1/3)/(1/3)/(1/3))).

Regarding claims 6 and 19, Fukuzawa and Nagahama disclose the features of base claim 1 as stated in the 103 rejection above, Fukuzawa further discloses:

Wherein the underlayer alloy comprises Au and Cu and the antiferromagnetic alloy comprises Pt and Mn (paragraph 313).

Regarding claims 7 and 20, Fukuzawa and Nagahama disclose the features of base claim 1 as stated in the 103 rejection above, Fukuzawa further discloses:

Wherein the thickness of the PtMn alloy antiferromagnetic layer is less than approximately 125 Angstroms (paragraph 38).

Regarding claims 8 and 21, Fukuzawa et al fail to specifically disclose:

Wherein the thickness of the AuCu underlayer is between approximately 10 and 200 Angstroms (paragraph 311).

Regarding claim 9, Fukuzawa and Nagahama disclose the features that are in common with those previously disclosed in claim 1, as stated in the 103 rejection above, Fukuzawa further disclosing:

A pinned ferromagnetic layer exchange-coupled with the antiferromagnetic layer (figure 26, Ferro-Magnetic Layer B) having a magnetization direction oriented substantially perpendicular to the plane of the recording medium (figure 26, arrow M^B is perpendicular to the bottom plane where the recording medium is) and substantially prevented from rotating in the presence of magnetic fields from the recording medium (paragraph 21, the antiferromagnetic layers function to pin the ferromagnetic layers);

A free ferromagnetic layer (figure 26, free layer) having a magnetization direction oriented substantially parallel to the plane of the recording medium in the absence of an external magnetic field (figure 26, arrow M`), said free layer magnetization direction being substantially free to rotate in the presence of magnetic fields (abstract) from the recording medium; and

A nonmagnetic spacer layer between the pinned ferromagnetic layer and the free ferromagnetic layer (figure 26, Non-Magnetic Intermediate Layer).

Regarding claim 22, Fukuzawa and Nagahama disclose the features of claim 22 that are in common with those features previously disclosed in claims 7, 8 and 9, as stated in the 103 rejections above, therefore, claim 22 is met on the same basis.

Regarding claim 23, Fukuzawa and Nagahama disclose the features of base claim 22 as stated in the 103 rejection above, Fukuzawa further disclosing:

Wherein the thickness of the PtMn alloy antiferromagnetic layer is between approximately 25 and 50 Angstroms (paragraph 38).

Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fukuzawa and Nagahama, as applied to claim 1 above, and further in view of Tanogami (JP Publication Number JP 2000251226 A).

Regarding claim 4, Fukuzawa and Nagahama disclose the features of base claim 1 as stated in the 103 rejection above, but fail to specifically disclose:

Wherein the antiferromagnetic alloy further comprises one or more of Cr, Pt, Pd, V, and Ni.

Tanogami discloses:

Wherein the antiferromagnetic alloy further comprises one or more of Cr, Pt, Pd, V, and Ni (Abstract).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to fabricate an antiferromagnetic layer of this material, as this material can improve corrosion resistance and increase resistance.

Claims 10 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fukuzawa and Nagahama, as applied to claim 9 above, and further in view of Baumgart et al (US Patent Number 5287238).

Regarding claim 10, Fukuzawa and Nagahama disclose the features of base claim 9 as stated in the 103 rejection above, but fail to specifically disclose:

Wherein the free layer is located between the substrate and the exchange-coupled structure.

Baumgart disclose:

Wherein the free layer is located between the substrate and the exchange-coupled structure (figure 10, item 65 is between items 61 & 69 therefore within the exchange coupled structure).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to place the free layer of Fukuzawa and Nagahama's magnetic head between the substrate and the exchange-coupled structure, as taught by Baumgart, because this is a well-known variation of the placement of parts which performs the same tasks.

Regarding claim 11, Baumgart further discloses:

Wherein the head is a current-parallel head having the sense current directed substantially parallel to the plane of the free layer (figure 10, current source will provide sense current in a loop which will provide parallel currents to the free layer).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have the magnetoresistive element of Fukuzawa et al operate by parallel plane current, as taught by Baumgart et al, because it is well known that magnetoresistive elements can operate by this current flow.

Claims 12-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fukuzawa and Nagahama, as applied to claim 9 above, and further in view of Kamijo (US Patent Number 6819532).

Regarding claim 12, Fukuzawa and Nagahama disclose the features of base claim 9 as stated in the 103 rejection above, but fail to specifically disclose:

Wherein the head is a perpendicular-in-the-plane head having the sense current directed substantially perpendicular to the plane of the free layer.

Kamijo discloses:

Wherein the head is a perpendicular-in-the-plane head having the sense current directed substantially perpendicular to the plane of the free layer (column 20, lines 26-42).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have the magnetoresistive element of Fukuzawa et al

operate by perpendicular plane current, as taught by Kamijo, because this will increase the sensitivity of the head making it more accurate.

Regarding claim 13, Kamijo further discloses:

Wherein the head is a spin-valve head (column 2, line 44) and wherein the nonmagnetic spacer layer is electrically conducting barrier (column 2, line 46-48).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to make the CPP head in claim 12 of Fukuzawa et al to be of the spin-valve type with a nonmagnetic conductive spacer layer, as taught by Kamijo, because this uses the scattering length of the electrons to conduct and change resistances for a signal reading.

Regarding claim 14, Kamijo further discloses:

Wherein the head is a magnetic tunnel junction head and wherein the nonmagnetic spacer layer is electrically insulating tunnel barrier (column 17, lines 38-56).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to make the CPP head in claim 12 of Fukuzawa et al to be a magnetic tunnel junction element, as taught by Kamijo, because this is a different approach which uses the probability of spin direction of electrons for a more sensitive signal due to lower resistance.

Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fukuzawa, Nagahama and Kamijo, as applied to claim 12 above, and further in view of Tanogami.

Regarding claim 17, Fukuzawa, Nagahama and Kamijo disclose the features of base claim 12, as stated in the 103 rejection above, but fail to specifically disclose the features that are in common with those previously disclosed in claim 4. Tanogami discloses the features of claim 17 that are in common with those previously disclosed in claim 4, therefore, claim 17 is met on the same basis.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew G. Kayrish whose telephone number is 571-272-4220. The examiner can normally be reached on 8am - 5pm M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wayne Young can be reached on 571-272-7582. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Matthew G. Kayrish

4/25/2007

MK

4/26/2007

WAYNE YOUNG
SUPERVISORY PATENT EXAMINER